Baird & McGuire Superfund Site
Holbrook, Massachusetts

FINAL
FIVE-YEAR REVIEW
FOR THE BAIRD & MCGUIRE SUPERFUND SITE

September 1999

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Prepared by:
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INTRODUCTION

This document is a comprehensive and interpretive report on the five-year review conducted for the Baird & McGuire Superfund Site (the Site) in Holbrook, Massachusetts, for U.S. Environmental Protection Agency (EPA) Region I. This work was conducted by Metcalf & Eddy (M&E) under the Remedial Action Contract Services (RACS) contract. The U.S. EPA is the lead agency and decision-maker for the Baird & McGuire Site.

Although not subject to the requirements of the following statutes, EPA Region I conducted this review in compliance with CERCLA section 121(c), NCP section 300.400(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991), and 9355.7-02A (August 1994). Since the remedial action for this site was selected on September 30, 1986, before the statutory date of October 17, 1986, compliance with the statute is not required. Other than completing the five-year review within the statutory timeframe of five years from the initiation of the remedial action, the five-year review was conducted in accordance with all statutory requirements for remedies selected after October 17, 1986. The actual first five-year review was due in 1996; all subsequent five-year reviews follow from that date. The next five-year review will be due by December 2001.

EPA guidance further stipulates that sites subject to five-year reviews with multiple operable units should conduct a five-year review for the entire Site, and not separate five-year reviews for each remedy or operable unit. The five-year review is triggered by the first operable unit giving rise to a five-year review. This five-year review report for the Baird & McGuire Site incorporates all operable units, as directed by the guidance (U.S. EPA, 1994).

In order to conduct the first five-year review at this Site, M&E reviewed existing Site documents and other materials that are the basis for the source control and groundwater treatment, including documents that outline the objectives, cleanup goals, and implementation of the remedial action. These documents include:

- Record of Decision (ROD) for OU-1 and OU-2, September 30, 1986 (U.S. EPA, 1986).
- Record of Decision (ROD) for OU-3, October 9, 1989 (U.S. EPA, 1989).
- Record of Decision (ROD) for OU-4, September 27, 1990 (U.S. EPA, 1990).
- Evaluation of Potential Future Reuse Opportunities for the Baird & McGuire Site (M&E, June 5, 1998).
- Nine months of Monthly Operations Reports (April 1998 – December 1998) for the groundwater treatment system (M&E Services).
- Performance evaluations and yearly plume evaluations performed by M&E, Inc. (M&E, July 1998, January 1998, February 1999).
- Remedial Action Report for OU-3 (USACE 1996).
- Results of Third Year of Long-Term Monitoring of Sediments and Soils (USACE 1998).
- Potential for Advection of Volatile Organic Compounds in Groundwater to the Cochato River, Baird & McGuire Superfund Site. USGS Draft Report. March and April 1998.

1.1 BACKGROUND

The five-year review was undertaken to review remedial actions completed at the Site to date, to ensure that the remedial actions remain protective of human health and the environment. This review is required by federal statute for any Site remedy which results in hazardous substances remaining on-site above a level that would allow for unlimited, unrestricted use (CERCLA §121(c) and 40 CFR §300.430(f)(4)(ii) of the National Oil and Hazardous Substances Contingency Plan).

1.1.1 Purpose of Report

The purpose of the five-year review is to confirm that the remedy as described in the Records Of Decision (RODs) and/or remedial design remains protective of human health and the environment. This report presents the results of a "Type Ia " five-year review, as determined by U.S. EPA Region

I and in accordance with OSWER Directive 9355.7-02A *"Structure and Components of Five Year Reviews."* This review includes elements of a Type Ia review (document reviews, regulatory review, Site inspection, ARARs review, statement of protectiveness and recommendations). The Type Ia review is similar in content to the Level I five-year review described in earlier EPA guidance (OSWER Directive 9355.7-02).

1.1.2 Site Background

The Baird & McGuire Superfund Site is located on South Street in Holbrook, MA, as show in Figure 1-1. The ROD defines the Site as the area within the EPA security fence constructed in July 1985. According to the FS, this fence encompasses all known areas of soil contamination related to Baird & McGuire (GHR, 1986). The Site boundary and coincident fence line are shown on Figure 1-2, based on a Site survey conducted in May 1988. The Site designated on Figure 1-2 has been determined to consist of approximately 32.5 acres.[1] For the purpose of increased security and access control measures during remedial actions, additional fencing was constructed in some areas beyond the Site boundary. This includes fencing around the groundwater treatment plant and recharge basins, and fencing beyond the southern Site boundary. The approximate location of this additional fencing is also shown on Figure 1-2, based on visual observations.

As illustrated on Figure 1-2, the Site is not limited to land within the Baird & McGuire property. Historically, Lots 130, 130-1 and 130-2 have had Baird & McGuire ownership. These lots consist of 9.33 acres, of which approximately 8 acres are within the Site boundaries. The remaining 24.5 acres of the Site consist of portions of five privately owned lots and two lots jointly owned by the towns of Holbrook and Randolph. In addition, four privately owned lots located west of the Cochato River (Lots 6, 12-2 and 12-3) have restricted access to the river due to the presence of the security fence.

1 Some paragraphs of the ROD and other project documents have stated that the site consists of approximately 20 acres. The reference to a 20-acre site originated in the RI Report (GHR, 1985) which preceded construction of the security fence that subsequently defined the site limits.

Figure 1-2 also shows significant ecological Site features, including the Cochato River, the unnamed brook, the 100-year floodplain, and wetland areas. Based on a wetland boundary delineation conducted during RI investigations, wetlands occupied approximately 44 percent of the Site. In addition, 66 percent of the Site was determined to be within the 100-year floodplain (GHR, 1986).[2]

1.1.3 Summary of Remedy Stipulated by Records Of Decision

Selected remedial actions for the Site were developed in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, in accordance with the NCP at 40 CFR Part 300.

EPA issued three RODs for the Site, defining four operable units and describing selected remedial alternatives. The first ROD, issued in September 1986, specified groundwater extraction and treatment at an on-site treatment plant (OU-1) and soil excavation and treatment at an on-site incinerator (OU-2). The second ROD, issued in September 1989, addressed contamination in the Cochato River sediments (OU-3). EPA issued the final ROD in 1990, which called for reopening the Donna Road well field to replace the lost demand resulting from contamination of the South Street wellfield (OU-4). The selected remedies being evaluated for protectiveness are:

- **OU-1: Groundwater Extraction and Treatment.** The RI/FS (GHR, 1985 and GHR,1986) identified and described the presence of a groundwater contamination plume, originating from the Baird & McGuire property and extending beyond the Cochato River. The 1986 ROD specified groundwater extraction and on-site treatment to address this contamination. The current system consists of six extraction wells that pump contaminated groundwater to a groundwater treatment facility, and four recharge basins for discharge of treated groundwater back to the aquifer.

- **OU-2: Soil Excavation and Treatment.** Based on the nature and extent of soil contamination documented in the RI/FS, the 1986 ROD specified the excavation of soil from "hot areas" with

2 The RI Addendum Report (GHR, 1986) predicts a 100-year flood elevation of 126.9 feet, as compared to the 128-foot 100-year flood elevation shown on the Holbrook Flood Insurance Rate Map. For the purpose of this report, the 100-year flood elevation of 128 feet is used, since this elevation corresponds to the designation of the Flood Plain Protection District on the Town Zoning Map.

subsequent treatment in an on-site incinerator. The hot areas were delineated in the ROD based on contamination profiles developed in the RI Addendum (GHR, 1986). The limits of excavation were established so that contaminant concentrations outside of the hot areas were one to two orders of magnitude lower than the concentrations inside the hot areas. Also considered in establishing the limits of excavation was the presence of wetlands and the extent of contamination in those wetlands, with the intent of minimizing disruption to wetlands. The ROD notes that although this approach results in residual soil contamination, future health risk for a trespasser scenario would be within an acceptable range.

- **OU-3: Sediment Excavation and Treatment.** The Baird & McGuire Site includes a portion of the Cochato River. This area begins at approximately the center of the Site fence along the Cochato River and extends north to Union Street. Cochato River sediment contamination was addressed by the September 1989 ROD for OU-3. The ROD specified excavation and incineration of approximately 1,500 cubic yards of contaminated sediments for protection of public health and the environment. Sediments were to be excavated on an average of six inches from approximately the center of the fenced Site area downstream to Union Street. Sediments were to be transported to the on-site treatment facility and subsequently placed as backfill on the Site.

  The ROD also required erosion control, wetlands restoration, placement of organic fill in the excavated areas of the river in the vicinity of the groundwater plume and long-term monitoring of downstream portions of the River where sediments were not excavated.

  To minimize the disruption of wetlands, sediments were not to be removed from areas of the river where contaminant concentrations were low, calculated risks were low, and no impacts were observed. In accordance with the ROD for OU-3, long term monitoring is to be conducted to evaluate remaining contaminant levels and their behavior over time (USEPA, 1989).

- **OU-4: Replacement of Lost Demand from Contamination of South Street Wellfield.** The South Street wellfield, which formerly was part of the municipal water supply for Holbrook, is within 1,500 feet of the Baird & McGuire property. The last operating well was shut down in

1982 due to organic contamination. The ROD for OU-4 was issued to address an alternate water supply/replacement of lost demand which resulted from the contamination and subsequent shutdown of the South Street wells. The reactivation of the Donna Road aquifer was selected as the alternate water supply.

1.1.4 Report Organization

This document is organized for a Level I review in accordance with EPA protocols. Section 1.0 provides an introduction to this five-year review, Site background information, descriptions of the ROD-specified remedies and remedial objectives. Section 2.0 summarizes present Site conditions and describe the status of the remedy for each operable unit based on document review and the Site visit. Observations of the Site visit are described in Section 3.0. Components of each remedy are described and a review of the performance of each remedy is also presented. Section 4.0 describes the results of a review of applicable or relevant and appropriate requirements (ARARs). Section 5.0 presents a discuss of compliance status of site actions based on the ARARs review and the evaluation of performance. Section 6.0 presents a general discussion of past risk evaluations performed for the Site. Section 7.0 describes non-engineering controls placed on the Site for protectiveness, and discusses their efficiency. Section 8.0 provides recommendations based on this Five-Year Review. It provides discussion of whether current technologies are achieving performance standards and provides recommendations for continued operation. It also presents a discussion of protectiveness of the remedy based on ARARs review and performance of the remedial actions. Lastly, Section 8.0 presents a discussion of the next review.

1.2 REMEDIAL OBJECTIVES

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is invoked; a

requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances. Section 121 also provides that if EPA selects a remedy not compliant with the above preferences, EPA is to publish an explanation as to why a remedial action involving such reduction was not selected. Response alternatives for the Baird & McGuire Site were developed to be consistent with these Congressional mandates.

EPA has established a three-tier approach to conducting five-year reviews, the most basic of which provides a minimum protectiveness evaluation (Level I Review). This report documents a Type Ia five-year review for the Baird & McGuire Site in Holbrook, Massachusetts, to confirm that the remedial action, as presented in the Records of Decision (OU-1 & OU-2, September 30, 1986; OU-3, October 9, 1989; OU-4, September 27, 1990) remains protective of human health and the environment.

This five-year review reassesses ARARs for substances identified as chemicals of concern in the RODs, and considers whether ARARs for substances not addressed under contaminants of concern have been changed such that the remedy is no longer protective. The review also considers pending or actual changes in zoning or land uses that could undermine the remedy. In addition, the review considers the need for institutional controls at and near the Site. A five-year review is herein performed for all operable units, using the information available, in accordance with five-year review guidance (U.S. EPA, 1994).

Remedial action objectives being evaluated for each operable unit as described in the RODs are as reiterated below.

1.2.1 OU-1: The remedial action objectives to address groundwater contamination at the Baird & McGuire Site are as follows:

- Remediate the contaminated aquifer within a reasonable time to prevent present or future impacts to groundwater drinking water supplies;
- Protect surface waters from future contaminant migration; and
- Minimize long-term management and/or maintenance requirements.

1.2.2 OU-2: The remedial action objectives for addressing contaminated soils at the Baird & McGuire Site are as follows:

- Minimize the risk for the human population of direct contact with contaminated soils/sediments;
- Protect surface waters from future contaminant migration; and
- Minimize long-term management and/or maintenance requirements.

1.2.3 OU-3: The remedy selected in 1989 was developed to satisfy the following remedial objectives, which will be used to measure the success of the remedy:

- Reduce human exposure to arsenic, DDT, polycyclic aromatic hydrocarbons (PAHs), and chlordane in sediment by excavating to an average depth of six (6) inches and by achieving the following levels of contaminants: 250 ppm for arsenic; 19 ppm for DDT; 5 ppm for chlordane; and 22 ppm for total PAHs. These concentrations correspond to a 1×10^{-5} to 1×10^{-6} excess cancer risk level; and
- Reduce environmental exposure to the same four contaminants of concern to concentrations corresponding to the mean sediment quality criteria (SQC) (EPA, 1988) in the river bed, and to the upper bound SQC in the wetland area north of Ice Pond.

Human health target levels for the four contaminants of concern are presented below, and site-specific target levels for ecological risk were set at sediment quality criterion for specific target locations (see Table 5 of the ROD, 1989). An organic layer of soil intended to act as a filter (to attenuate groundwater discharge) was placed in the vicinity of the groundwater plume where achieving SQCs would be difficult. Sediment sampling conducted in December of 1998 in the area of the groundwater

plume where the organic fill material was placed did not reveal any detectable levels of the contaminants of concern in the sediment.

OU-3 ROD-SPECIFIED HUMAN HEALTH TARGET LEVELS FOR SEDIMENT CONTAMINANTS OF CONCERN

Compound	Target Level[1] (10^{-5} Risk) (ppm)	Target Level[1] (10^{-6} Risk) (ppm)
Arsenic	2500	250
PAHs	22	2.2
DDT	190	19
Chlordane	50	5.0

1. These concentrations correspond to the indicated target risk level based on exposure to a single compound and do not assume concurrent exposure with other contaminants.

While the target levels derived for protection of human health were based on a 1×10^{-5} excess cancer risk level, the ROD expected remediation to achieve a greater level of protection for three of the four contaminants of concern. For the contaminants arsenic, DDT and metabolites, and chlordane, a 1×10^{-6} excess cancer risk level was anticipated to be achieved by the remediation. The contaminant of concern that would achieve only the 1×10^{-5} level is total PAHs, which are found widely throughout the Cochato River drainage basin. Sediment was remediated to this human health level; the overbank was remediated to 1.5 times this level. It is expected that natural degradative, depositional, and dispersal processes would gradually reduce contaminant concentrations in the remaining downstream sediment without engineering measures being taken. Full evaluation of this remedy as part of this five-year review would be premature due to insufficient time for decreases in sediment and fish contaminant concentrations to occur. Yearly monitoring of sediments downstream of the Site, along with fish data collected on a five-year basis, will be evaluated when the next five-year review is due for OU-3 to determine if the selected remedy remains protective of human health and the environment.

1.2.4 OU-4: Replacement of Lost Demand from Contamination of South Street Wellfield.

Based on preliminary information such as constraints of the present water system and known available water sources, a remedial action objective was developed to aid in the development and screening of alternatives. The response objective for OU-4 is:

- To identify a candidate water source that will replace the 0.31 million gallons per day (mgd) Lost Demand in an environmentally sound, cost-effective manner without placing additional stress on the Great Pond Reservoir system or existing water treatment facilities.

SECTION 2.0
PRESENT SITE CONDITIONS

This section summarizes the remedies and current conditions for each Operable Unit at the Baird and McGuire Superfund Site in terms of design, implementation and performance. In general, the groundwater remedy (OU-1) is ongoing. The soil (OU-2) and sediment (OU-3) remedies have been completed and are being monitored. The remedy for the replacement of lost demand from contamination of the South Street well field (OU-4) has not been implemented.

2.1 GROUNDWATER REMEDY (OU-1)

The groundwater remedy at the Site is ongoing. A groundwater treatment facility (GWTF) and extraction/recharge system were built in 1991 and remain in operation, with modifications. The purpose of the system is to contain and remove the plume of contaminated groundwater. Whitman and Howard operated the system for one year (under subcontract to Barletta). The O&M contract was then awarded to M&E Services/PSG who has operated the GWTF since 1993.

2.1.1 Components of the Remedy

The three main components of the groundwater remedy are extraction, treatment, and recharge.

Groundwater Extraction. The groundwater extraction system consists of six extraction wells (EW-2 through EW-7) each operating at a flow rate of between 10 and 35 gpm. The well locations are shown on Figure 2-1. The system was originally designed to pump at a maximum total rate of 200 gpm. The wells pump the groundwater via separate pipes to an extraction well control building located south of the extraction system. Within the building, the water converges to a single header pipe, which conveys the water to the GWTF. All extraction system controls (e.g., valves, flow meters, electrical switches) are housed within the extraction system control building. The wells are operated remotely through use of a programmable logic controller (PLC) located at the GWTF.

Figure 2-1 also shows the locations of the numerous monitoring wells that exist at the Site. At many of the monitored locations, multiple wells have been constructed. These well clusters allow water levels and water quality to be determined at different depths in the stratified drift deposits, in the till deposits and weathered bedrock zone, and in the underlying fractured bedrock. Data gathered from the monitoring wells are used both to determine the area of capture of the extraction well system and to monitor the improvements in water quality resulting from groundwater extraction and treatment.

Groundwater Treatment Facility. The GWTF is located off of South Street as shown on Figure 2-1. It consists of the following unit operations housed within a single building:

- Metals pretreatment consisting of treatment of the influent stream by hydroxide precipitation and ferric chloride to remove heavy metals and arsenic, and the addition of polymer to enhance iron removal.
- Biological treatment by activated sludge process for removing certain volatile and semivolatile organic compounds from groundwater.
- Granular activated carbon adsorption for removing additional organics not removed in the biological treatment process.
- Filtration for removing suspended solids carried over from the biological process.
- Sludge dewatering used for decreasing the water content of the metals hydroxide sludge.
- Metals hydroxide sludge disposal in a RCRA hazardous waste landfill.
- Vapor phase carbon adsorption for treating off-gases from various tanks.

The design capacity of the GWTF is 200 gpm. The target range of flow for successful plume containment, as determined by groundwater modeling (M&E, 1995) is 150 to 200 gpm. An on-site laboratory is located at the Site for analysis of process flow and groundwater monitoring samples. The GWTF operations is staffed 24-hours a day.

Groundwater Recharge System. Treated water from the GWTF is recharged back to the groundwater through four infiltration basins, each with dimensions of 100' by 100' (see Figure 2-1).

Water is discharged to one basin at a time while the other three basins remain inactive. Discharge is rotated to other basins on a weekly basis, to prevent overuse of any one basin and to allow maintenance of a particular basin if recharge capacity is diminished.

2.1.2 System Operation and Equipment Modifications

There have been several modifications/refinements made since construction of the groundwater remedy. Most of the modifications were made to enhance and optimize operations at the GWTF and to optimize groundwater extraction and plume containment. The major modifications are listed below:

Additional Extraction Wells. Since construction of the system, one extraction well has been decommissioned and two extraction wells have been added to the system. EW-1 was decommissioned due to its low yield and minimal contaminant removal performance. It was replaced with EW-8, which was placed on-line in the spring of 1999 and is operating at a rate of between 18 gpm and 25 gpm. EW-7 was also added to the system to enhance plume containment efforts near the Cochato River. EW-7 was placed on line in spring of 1998 and is currently operating at a rate of approximately 30 gpm. There are currently seven operational extraction wells (EW-2 through EW-8).

Extraction System Control Building (ESCB). This new building was constructed in early 1998 and houses the extraction well controls. The controls were originally located at the well heads within concrete vaults; electrical controls were originally within aboveground electrical panels at each well. All controls, including control valves, flow meters, electrical panels and sample taps are now centrally located with the ESCB. Building construction was completed in early 1998.

Extraction Well Piping. The original extraction system was designed so that discharge piping from each extraction well fed into a common header pipe leading to the GWTF. Individual extraction well piping was subsequently installed; groundwater is now fed to the extraction system control building where it is conveyed to the GWTF.

LNAPL Remediation System. A LNAPL (light non-aqueous phase liquid) remediation system was designed to remove pure-phase contaminants floating on the water table. From yearly contaminant plume evaluations, LNAPLs were determined to be a major source of groundwater contamination. The LNAPL at this site contains a mixture of various chemicals in pure phase (undissolved) that are lighter than water and therefore float on the water table. The LNAPL chemicals slowly dissolve into groundwater causing a continuing source of groundwater contaminants. The LNAPL remediation system was designed to remove pure product floating on the water table by the use of skimmer pumps and total fluids recovery pumps in two existing extraction wells (EW-3 and EW-6) and one new extraction well (EW-8). The discharges from these pumps were designed to flow through an oil-water separator to separate the oil phase from the water phase. The recovered LNAPL will be disposed of off-site and the water will be recirculated though the wells. A scaled-down version of the system consisting of LNAPL removal from EW-8 and two nearby monitoring wells (MW-97-1 and MW-98-1) was constructed. Start-up of this system occurred in the spring of 1999 and is currently removing LNAPL at a rate of 5 to 8 gallons per day. LNAPL removal equipment at EW-3 and EW-6 may be added in the future, if deemed necessary.

Bioreactors. During the first year of operation, it was discovered that a viable biomass could not be sustained within these units due to the lower than expected concentration of contaminants. However, it was also discovered that removal rates of semivolatile and volatile organic compounds exceeded 90% within these units due to aeration. Therefore, although these units are not operating as bioreactors, they remain on-line due to the air stripping that occurs.

Vapor Phase Carbon. Off-gases from the bioreactors and headspaces of process area tanks were originally evacuated and treated by a fume incinerator. Based on a value engineering study, off-gas treatment was switched to vapor phase carbon in June 1998.

Polymer Addition to Enhance Metals Removal. Existing clarifiers were modified for the addition of polymer, to assure enhanced floc formation and settlement at higher plant flow rates. This modification was implemented in the spring of 1998.

Internal Modifications. Internal modifications such as piping changeovers, and pump upgrades were made to increase the capacity of the groundwater treatment plant. The plant is now capable of treatment at a rate of up to 200 gpm.

Back-up Generator. Electrical circuitry was modified to allow the entire treatment plant to operate on a back-up generator. Originally, a back-up generator operated only lighting and other bare essentials.

2.1.3 System Performance

The historic performance of the extraction/recharge system and the GWTF is summarized below. This summary is based on performance evaluations performed by M&E (M&E 1995, M&E 1997), recent evaluations of 1998 plume data by M&E, discussions with GWTF personnel and eight monthly operation reports from the plant (May 1998 to December 1998).

Extraction/Recharge System. With the exception of short-term interruptions (i.e., a few days to a few weeks), the extraction/recharge system has operated continuously since start-up at varying system flow rates. The most significant variations in system flow were during source control remediation. During this time, a significant amount of water from the excavation dewatering operations performed was being pumped to the GWTF and treated. The flow from the extraction wells was decreased to balance the incoming flow to the plant. Despite this redistribution, the combined effect of dewatering and extraction well flow still achieved project objectives of contaminant removal. However, full plume containment was questionable during this two-year period (June, 1995 through July, 1997). After source control remediation was completed in 1997, the extraction systems were brought back to full operation.

Since the completion of source control, further progress has been made in achieving the target flow range of 150 gpm to 200 gpm. Technical problems with EW-2, EW-3 and EW-6 (e.g. faulty pumps, low water levels faulty sensors) have sometimes hampered the effort to pump in the target flow range. The addition of EW-7 and EW-8 allowed the system flow rate to pump over 150 gpm. The operators

of the GWTF and the extraction system are currently trying to determine optimal flow rates from each extraction well so that the system flow rate will exceed 150 gpm continuously.

Recent data have shown that contaminant levels have dropped significantly in discharge from extraction wells EW-2 and EW-4, indicating success in groundwater cleanup. An evaluation is currently being performed to determine if these wells should remain on-line or if groundwater pumping can be distributed to other wells to focus pumping on more contaminated portions of the plume.

The recharge system has performed as designed. The basins are used on a rotational basis to ensure long-term effectiveness of each basin.

Groundwater Treatment Facility. Up until the spring of 1998, the GWTF had difficulty in accommodating influent pumping rates of greater than 150 gpm due to piping and plumbing problems. Recent upgrades in the GWTF as discussed above, have resolved these problems.

In general, the GWTF discharge meets the discharge criteria for all compounds (1986 MCLs). There have been exceedances of iron in the past (i.e., above the secondary MCL of 0.30 mg/L). However, as discussed above, the iron removal process has been enhanced within the last year, and consequently, there have been no exceedances since these modifications were completed. Table 2-1 summarizes monthly average discharge levels for the GWTF over the period from May to December 1998 and indicates that over that period, discharge criteria have been met. Table 2-2 summarizes total influent and effluent levels for VOCs, SVOCs, arsenic and lead and lists the percent removal within the plant for the last eight months.

Between March and December 1998, high levels of acetone were detected in the plant influent stream. Acetone was also detected in on-site and off-site monitoring wells and surface water. The source of acetone is not believed to be site-related. The acetone was not removed by the GWTF and therefore, flowed through the system dissolved in water and was discharged back to groundwater via the infiltration basins. Since there is no MCL for acetone, this was not considered a violation of the

discharge criteria. Since December 1998, acetone has not been detected in the plant effluent, in Site monitoring wells, or in adjacent surface water.

2.1.4 Data Evaluation

Plume Evaluations. Evaluations of extraction system performance in regard to contaminated groundwater remediation and containment have been performed. These evaluations generally involve creating contour maps ("plume maps") of total VOCs and SVOCs in overburden and bedrock for a comprehensive round of groundwater sampling performed by the GWTF operator. Four quarterly sampling rounds, including one comprehensive round of the majority of the Site monitoring wells, are performed each year. Plume maps were created for the years 1988 (prior to system start-up), 1995 (two years after start-up), 1997 (following source control remediation) and 1998. Plume maps for 1988 and 1995 are documented in the report entitled *Evaluation of Extraction System Performance at the Baird & McGuire Site* (M&E, 1995). Plume maps for 1997 are documented in a letter to EPA dated January 29, 1998 (M&E, 1998b). Plume maps for 1998 are documented in a letter to EPA dated March 3, 1999 (M&E, 1999). Both 1997 and 1998 plume maps are included in Appendix A.

A comparison of these maps indicates that the plumes of VOCs and SVOCs have decreased in size over time. Comparison of 1997 maps with 1995 maps indicated that the edge of the plume (i.e., 5 ppb contour line) has moved inward toward the source since the 1995 sampling event (M&E, 1998b). This is further evident when comparing 1998 plume maps with 1997 plume maps. Table 2-3 lists total VOC and SVOC concentrations over time for most of the Site wells. Concentrations have generally decreased over time. It should be noted that several site wells were replaced after being destroyed by source control remediation. The original well name and the replacement well name are listed in Table 2-3 for clarity.

Based on yearly plume comparisons, field observations, and other data, it was concluded that a continuous source of contamination exists at the center of the plume and that this source is likely (LNAPL). This led to EPA requesting an LNAPL survey and implementing the LNAPL remediation system.

The 1998 plume maps indicate that these LNAPL sources still exist within the plume (as evidenced by the plume hot-spots), but concentrations have decreased. One possible cause of the decrease is the combined effect of extraction well upgrades (including the addition of EW-7) and source control remediation completed in early 1997. Despite the continued decrease in plume size, concentrations in groundwater are still far above the target cleanup levels (MCLs). EPA plans to continue evaluations of plume maps on a yearly basis to track progress in remediation.

LNAPL Investigation. EPA requested an investigation of the existence of LNAPL at the Site to confirm that LNAPLs exist near the center of the plume. This investigation, performed in November and December 1997 and documented in a report prepared by McCulley, Frick and Gilman, Inc. (MFG), under subcontract to M&E Services/PSG (MFG, 1998), confirmed that LNAPLs were present in Site wells. The results show that a layer of LNAPL floating on the groundwater is present in the central part of the site only, as shown on Figure 2-2. LNAPL thicknesses in wells ranged from trace levels to a maximum of 3 feet.

Chemical analyses of one LNAPL sample collected by M&E Services/PSG (near the center part of the site) indicated that the LNAPL primarily consists of semi-volatiles such as naphthalene (3,000 ppm), fluorene (3,600 ppm), phenanthrene (3,800 ppm), acenapthene (8,100 ppm), acenapthalene (9,700 ppm), fluoranthene (6,300 ppm) and pyrene (500 ppm). The LNAPL also contains significant levels of volatiles (primarily BTEX) including benzene (33 ppm), ethylebenzene (1,720 ppm), toluene (522 ppm), total xylenes (8,480 ppm). Several pesticides were also found (e.g., lindane, dieldrin, endrin, 4,4-DPD and 4,4-DDE). These compounds primarily comprise the dissolved phase plume leading to the conclusion that LNAPLs are the source of the plume. Although the LNAPL sample was not analyzed for inorganics, evaluation of dissolved plume concentrations of arsenic indicates that the highest dissolved concentrations of arsenic are generally coincident with the locations where LNAPL was found or suspected. It is assumed that ongoing LNAPL remediation will help reduce arsenic levels as well as other organic and inorganic compound levels in groundwater.

Based on the findings of the plume studies and LNAPL investigation, EPA moved forward with implementation of the LNAPL Remediation System. The purpose of this system is to remove

LNAPLs to accelerate groundwater remediation. The LNAPL remediation system is currently on-line, removing LNAPL at a rate of 5 to 8 gallons per day.

Discharge to the Cochato River. All plume maps developed to date have indicated that the contaminant plume extends across the Cochato River. This suggests that contaminated groundwater could at times discharge to the river. In April 1998 at EPA's request, the USGS performed a study of the Cochato River to investigate potential discharge to the river (USGS, 1998). The USGS installed piezometers in the river sediments to investigate vertical gradients, and multi-level vapor-diffusion samplers to detect the presence of VOCs in sediment pore water. The investigation found that upward vertical gradients (from the aquifer to the river) existed at the time of the sampling. Also, VOCs and SVOCs were detected in diffusion samplers. This indicates that some level of contaminants were migrating into the river at that time. Since this sampling technique does not allow for a direct correlation to surface water concentrations from the vapor diffusion sample data, surface water samples were also collected. The surface water sampling conducted during this event and on several occasions afterward (by EPA), have not detected any contaminants in the river water that are present in the groundwater plume or in any samples from the vapor diffusion samplers.

Although the USGS findings suggest groundwater could have been discharging to the river at the time of sampling, it was noted that during the investigation the extraction system was operating at only 65 gpm, with only four of the six extraction wells operating. In addition, extreme precipitation conditions existed during the sampling effort, which caused higher than normal groundwater levels and gradients. Consequently, while it is likely that full plume containment was not occurring during the April event, the study was inconclusive with regard to whether there is groundwater discharge to the river during times when the extraction system is operating within the target extraction range of 150 to 200 gpm.

Natural Attenuation. There is evidence to suggest that biodegradation is occurring within the plume. In general, suitable conditions exist for biodegradation of chlorinated compounds by reductive dechlorination and biodegradation of other organic compounds such as BTEX and PAHs (e.g.,

napthalene) by aerobic oxidation and iron reduction. The evidence for biodegradation of organic compounds is as follows:

- Decreasing concentrations of PCE and TCE in the dissolved plume over time;
- Decreasing BTEX concentrations in the dissolved plume over time;
- Suitable concentrations of electron acceptors and electron donors (required for biodegradation);
- Presence of chloride and chlorinated solvent daughter products such as 1,2 DCE and vinyl chloride;
- Low concentrations of nitrate in the plume area; and
- Increased iron concentrations in the plume area.

The process of biodegradation may be helping to attenuate the plume beyond the source areas (e.g. across the Cochato River and on the north side of the plume) and could be a significant factor in total plume remediation once the groundwater sources (LNAPLs) are removed. For this reason, future five-year reviews will consider natural attenuation in the evaluation of the efficacy of attaining cleanup goals. Future groundwater monitoring should be tailored to collect pertinent data necessary for evaluation of natural attenuation.

2.2 SOILS REMEDY (OU-2)

The source control remedy (removal and treatment of contaminated soils) commenced in June 1995 and was completed in July 1997. Monitoring activities conducted since completion of treatment of on-site soils. Ongoing O&M activities include annual inspections and maintenance of the soil cover as well as wetlands monitoring. All soils excavation and treatment facilities have been decommissioned and removed.

2.2.1 Components of the Remedy

Major components of the Site source control remedy were erosion control, excavation of soils, dewatering, backfilling of incinerated material, extraction well piping relocation of the unnamed stream, incineration, site restoration, wetlands restoration and monitoring.

Erosion Control. Cleared, excavated and backfilled areas were protected from erosion using temporary drainage ditches, berms silt fences, hay bales, erosion checks and temporary and permanent vegetation. Wood sheeting was installed along the Cochato River to control erosion and sediment transport to the river.

Excavation. The Site was cleared and grubbed, and excavation haul roads were built prior to excavation. Wood sheet piling was installed along the river to facilitate excavation and dewatering in that area. During the design and implementation of OU-2, the excavation limits were modified to encompass a slightly larger area than specified in the ROD. The modified excavation limits are shown on Figure 2-3. Soils were excavated to approximately one foot below the seasonal low water table within the excavation limits, with excavation depths ranging from approximately 3 to 33 feet below grade. Soils were excavated in 100' by 100' grids. Approximately 248,000 tons of soil and sediment were excavated and treated by on-site incineration. Soils were stockpiled on site for storage prior to incineration.

Dewatering. During excavation, dewatering was required to depress the water table to one foot below the seasonal low water table. A maximum of 100 gpm was pumped for dewatering purposes and conveyed to the GWTF for treatment. Dewatering was accomplished by placing a sump pump within the excavation. Water was then pumped to a 100,000-gallon holding basin and on to the GWTF.

Backfilling. Approximately 250,000 tons of the treated soil (i.e., ash) were backfilled into the 12.5-acre excavation area. Approximately 320 tons of ash which failed the leaching criteria were stabilized with cement prior to backfilling to reduce the potential for leaching of contaminants by infiltrating

rainwater. The location where stabilized ash was placed is shown on Figure 2-3. A composite sample of soils remaining at the base of the excavations was taken prior to backfilling to determine the magnitude of residual contamination.

Extraction Well Piping Relocation. Extraction well piping was replaced at the end of the excavation process. Single header pipes were replaced with individual pipes conveying water from each extraction well to the main extraction well junction chamber. The main chamber was used as a vault foundation for the Extraction System Control building completed in 1998.

Unnamed Stream Relocation. The unnamed stream was temporarily relocated and a culvert pipe was installed for its upper portions. The stream was redirected back to its natural course as part of wetlands restoration.

Incineration and Stabilization (IS) Facility. The IS facility consisted of the following primary components:

- Materials Handling Unit
- Thermal Destruction Unit (TDU) Feed System
- Rotary Drying Chamber
- Rotary Kiln
- TDU Ash Quench and Removal System
- High Temperature Baghouse
- Scrubber
- Heat Exchanger and Cooling Tower
- Scrubber Blowdown Water Treatment System
- Secondary Combustion Chamber
- TDU Exhaust System.

The primary component of the Thermal Destruction Unit (TDU) was the Rotary Kiln. Materials were incinerated at a temperature of approximately 1,200 °F. Approximately 248,000 tons of material was

incinerated. TCLP tests were performed on the ash. Approximately 320 tons of material failed to meet criteria and was stabilized with cement prior to backfilling.

Site Closure. Upon the completion of soil excavation and treatment, the incineration contractor initiated Site closure activities as described in the Revised Site Closure Plan (OHM, 1997). These activities included decontamination, decommissioning and removal of the incinerator building and equipment; off-site disposal of material generated during demobilization and Site closure, which could not be treated on-site; utility closeout; final grading, and Site restoration.

Site Restoration. Site restoration involved decommissioning the IS facility, final grading of the excavation zone, placement of topsoil and seed and wetlands restoration (OHM, 1993). As part of the decommissioning activities, the former concrete foundation of the incinerator building was crushed and placed within the excavation area along with the backfilled ash. The approximate disposal location of this foundation material is shown on Figure 2-3. Twelve inches of topsoil were placed over the incinerated soil and the Site was hydroseeded.

Site restoration also included replacement of monitoring wells destroyed during source control remediation. In general, wells were replaced in the general vicinity of the original well, with some variations in screened intervals. Existing wells are shown on Figure 1-2.

Wetlands Restoration. Mitigation of unavoidable wetland impacts associated with the remediation was required to comply with wetlands ARARs. The Final Site Restoration Plan (OHM, 1993), required the on-site restoration of approximately 7.4 acres of forested and scrub/shrub floodplain wetlands, including a small peat bog and 1,000 linear feet of the unnamed brook. The plan also required restoring the wetland to the approximate original grades and elevations, backfilling with organic topsoil (at least 20 percent organic matter by weight) and seeding and planting with appropriate herbaceous, shrub, and tree species. The relocated stream was to be re-created similar to the original stream in width, depth and bottom characteristics. Once grading and seeding were completed, the plan required, sequentially, hydrologic monitoring through one full growing season; adjusting grading as necessary, repeating seeding as needed, and planting of shrubs and trees. The

plan also required annual monitoring of the wetlands for three years following completion of the restoration efforts.

The peat bog area was backfilled with organic topsoils as required by the Site Restoration Plan. Grading, seeding and planting of the restored peat bog was completed in 1998. Grading of the remainder of the wetland (the majority) was completed in early 1996 and seeding and planting was completed during the 1996 growing season. The backfilled soils in the majority of the wetland were less than 20% organic content required by the restoration plan. However, it was anticipated that if the wetland soils are saturated within the top 12 inches of the ground surface for at least 14 days during the growing season, the soils would eventually develop sufficient organic and hydric characteristics.

Hydrologic monitoring is being performed as part of the wetland restoration plan. This plan requires hydrologic monitoring during the growing season from approximately May 1 through October 1. Based on the data, EPA and USACE will evaluate whether sufficient hydrologic conditions are present to allow the wetland soils to develop naturally with no disruption to existing vegetation.

In September 1997, a USACE and a M&E wetlands scientist inspected the wetlands. The condition of many of the new plants was observed to be poor. Physical trauma to the plants and insufficient hydrology, rather than poor soils, may have been the cause of the poor condition of the vegetation. Subsequent to the September 1997 inspection, EPA and USACE required the following measures as partial remediation for the inadequate soil organic content in the restored wetlands.

- The addition of topographic and habitat diversity to the restored wetland, creation of one shallow, irregularly shaped pool (approximately 1,500 square feet) and planting the pool with emergent vegetation.
- Construction of gabion check dams and coconut fiber rolls across the unnamed stream to enhance the hydrology of the restored wetlands.
- Placement of a fiber roll, or similar structure, along the edge of the Cochato River to ensure water continues to pond in the wetland.

EPA & M&E concluded from the site visit conducted for this five-year review that, although the wetland was not restored with the organic soils recommended in the Final Restoration Plan, the mitigative measures required by EPA and USACE after the 1997 wetlands inspection appeared to have been implemented. The wetland will be monitored annually for three years (until the fall of 2000) in order to assess the success of the wetland restoration effort.

Continued Monitoring. The only remaining activities of the source control remediation are follow-up inspections and yearly monitoring of the wetlands. This will be performed for a period of three years after restoration (until 2000).

2.2.2 Data Evaluation

The source control contractor took composite soil samples from the base of the excavations prior to backfilling. In addition, the backfilled ash was characterized by composite ash samples. In the Site Reuse Report (M&E, 1998), these data were used in a qualitative evaluation of risk for future Site use.

Bottom-Depth Samples. A total of 61 composite bottom-depth soil samples were taken and analyzed for SVOCs, pesticides, arsenic and lead. These samples were taken from 100' by 100' excavation grids over the entire excavation zone.

The bottom-depth samples varied in depth from 2.9 to 33.4 feet below grade. Most of the bottom-depth soil samples exhibited residual contamination due in part to the fact that they are below the existing water table in zones of groundwater contamination. The SVOCs detected consisted primarily of polycyclic aromatic hydrocarbons (PAHs) whereas the pesticides consisted primarily of DDT, DDD, DDE, dieldrin and chlordane.

Ash Samples. The source control contractor analyzed incinerated soil (ash) prior to backfilling within the 12.5 acre excavation area. Samples of each 300 tons of ash were taken prior to backfilling for a total of 950 routine compliance samples. Analytes for these samples consisted of lead, arsenic and

up to 11 organic analytes. Sixteen quarterly samples of the ash were taken and analyzed for VOCs, SVOCs, pesticides, dioxins/furans and 12 metals. Toxicity characteristic leaching procedure (TCLP) tests were performed on samples of calciner ash. Results of ash sampling can be found in the Site Reuse Report (M&E, 1998).

2.3 SEDIMENT REMEDY (OU-3)

The remedy for OU-3 involved removal of contaminated sediments from the Cochato River. This remedy commenced in May 1994 and was completed in June 1995. The results of this remedy are described in detail in the Remedial Action Report for OU-3 by the New England Division (NED) of the Army Corps of Engineers (NED, 1997).

2.3.1 Components of the Remedy

Major components of the sediment remedy were Site preparation, sediment dredging, placement of organic fill and O&M.

Clearing Grubbing, Detention Basin and Haul Roads. The river banks were cleared and grubbed in preparation for river excavation. A detention basin was built in the river just downstream of the Union Street Bridge to trap suspended sediments during dredging. The detention basin was subsequently removed. Temporary haul roads were constructed and then removed after testing showed no residual contamination.

Dredging. Sediments were dredged from a 2,100-foot reach of river extending from the Baird & McGuire Site to the Union Street bridge (see Figure 2-4). Sediments were dredged to a minimum depth of six inches and a maximum depth of 24 inches in some areas. Dredged material was placed in sealable containers and transported to the Baird & McGuire exclusion zone where it was stored for subsequent incineration. A total of 4,712 cu. yd. of material was removed from the river. Dredged material was transported to the IS facility, incinerated and placed as backfill within the OU-2 soil excavation area.

Placement of Organic Fill. The portion of the river where contaminated groundwater underlies the riverbed was backfilled with approximately 438 cubic yards of clean organic fill. This organic fill acts as a filter which will attenuate contaminated groundwater that may discharge into the river.

Operation and Maintenance. Work in the dredged areas is complete and requires no future operation and maintenance (NED, 1996a). EPA developed and is currently implementing a long-term monitoring plan for the river downstream of the dredged area as part of the OU-3 Operations and Monitoring plan. This program, which is currently ongoing and is scheduled to last 30 years, includes analyses of sediment and fish. Sediment samples will be collected annually for the first five years and fish samples will be collected every 5 years, after which there will be a review of the data and trends. After the review, sampling frequency may be reduced if the contaminant levels are not increasing (NED, 1996a). If contaminant levels are increasing, there may be additional sampling in the dredged reaches of the Cochato River, including an analysis of contaminant accumulations in the organic material backfilled in the river.

Restoration of Wetlands. Wetlands adversely impacted by the dredging and the installation of haul roads were restored under the OU-2 Final Restoration Plan.

2.3.2 Performance

River sediments were remediated to the following human health target cleanup levels:

- Arsenic – 250 ppm
- DDT and metabolites (DDD and DDE) – 19 ppm
- Chlordane – 5 ppm
- Total PAHs - 22 ppm

Cleanup criteria for the riverbanks, as determined by EPA and in consultation with MADEP, is 1.5 times the human health criteria used for sediment (NED, 1996).

NED inspected work as it proceeded. Samples taken from the river channel and overbank reaches were analyzed in the USACE NED Environmental Laboratory for PAHs, chlordane, DDT and metabolites (DDD and DDT) and arsenic. Sampling results showed that all reaches met target cleanup levels (NED, 1996).

2.3.3 Long-Term Monitoring

The OU-3 ROD states that no excavation (dredging) would be performed downstream of the Union Street Bridge due to the potential adverse environmental impacts it would cause. Instead, the ROD requires long-term monitoring on an annual basis of downstream areas. The ROD also requires that the monitoring data be evaluated at least once every five years to assure that the remedial action continues to protect human health. Monitoring of surface water quality was not included in the ROD monitoring plan because the data collected in the Site RI/FS indicated no detectable levels of contaminants in surface water. Nevertheless, surface water samples have been collected in the Cochato River adjacent to the site on a weekly basis; no contaminants above detectable levels have been found. Fish monitoring is also performed to monitor the impact of sediments on the fish population.

Long-term sediment sampling is performed by NED and involves taking three random samples from six locations (strata) for a total of 18 samples annually. The six samples are taken from four general areas (see Figure 2-4):

A: Upstream of the project area (control)
B: Between the Union Street Bridge and Center Street
C: Ice Pond (two areas)
D: Mary Lee Wetlands (two areas)

Results are statistically analyzed using the ANOVA (analysis of variance) technique. The results of the third year of long-term monitoring of sediments performed in September 1998 are documented in a USACE monitoring report submitted to EPA (NED, 1998). The results show that all arsenic, chlordane and total DDT levels were below channel criteria. Total PAHs were below the channel

criteria, but four overbank samples exceeded channel criteria and one overbank sample exceeded the overbank criterion of 33 ppm (1.5 x 22 ppm = 33 ppm). However, this only occurs if it is assumed that the results are equal to the detection limit for the individual PAH; if the results are assumed to equal half of the detection limit, the total PAH result is below 33 ppm. The results show no discernable trends in the first three years of sediment sampling.

2.4 REPLACEMENT OF LOST DEMAND (OU-4)

The ROD for OU-4 was issued to address alternate water supply/replacement of lost demand that resulted from the contamination and subsequent shutdown of the South Street well field (part of the water supply for Holbrook) in 1982. The wellfield is within 1,500 feet of the Baird & McGuire property. The reactivation of the Donna Road aquifer was selected in the OU-4 ROD as the alternate water supply.

2.4.1 Components of the Remedy

The remedy includes the following components:

- Permitting/Predesign Studies
- Groundwater Extraction
- Treatment
- Delivery to the Distribution System

2.4.2 Performance

Currently, the system is in the design stages. Future five-year reviews will need to address the performance of this remedy.

SECTION 3.0
SITE VISIT

A Site visit was conducted on September 30, 1998 to observe Site conditions. The EPA RPM, M&E project engineer, ARARs specialist, and wetlands scientist attended the Site visit. The Site visit included a physical inspection of the Site including the regraded and seeded potions of the Site, the restored wetlands, the Cochato River, the extraction wells and recharge basins, the Extraction System Control Building and the Groundwater Treatment Facility (GWTF). Observations are listed below.

3.1 REGRADED AND SEEDED PORTIONS OF THE SITE

In general, it appeared that there was a significant growth of grass on the regraded portion of the Site. Some additional grading activities were being performed at the time of the Site visit to create surface water diversion channels around the extraction system control building.

3.2 RESTORED WETLANDS

A wetlands inspection was performed during the Site visit. One objective of this visit was to check that the mitigative measures requested by USACE to compensate for the lack of organic soils in backfill had been implemented. Although this inspection was conducted after the growing season, when the plants were senescent, the wetlands plants that were planted by the source control contractor appeared to be in good condition.

It was observed that one shallow pool had been created by the source control contractor. Three check dams had been constructed in the unnamed stream and were functioning. As a result, water was ponding in wetlands near the Cochato River in some locations.

EPA and M&E concluded from this Site visit that, although the wetland was not restored in accordance with the Final Restoration Plan (with regard to placement of organic soils), the mitigative measures required by EPA and USACE after the 1997 wetlands inspection, appeared to have been

implemented. The wetland will need to be monitored annually for three years, in accordance with the Final Restoration Plan, to assess the success of the wetland restoration effort. The first monitoring report was completed in the fall of 1998. USACE is currently reviewing this report.

3.3 COCHATO RIVER

No extraordinary conditions were noticed with regard to the Cochato River. Piezometers used in the USGS study of the Cochato River in April 1998 were still existing within the river channel.

3.4 EXTRACTION WELLS AND RECHARGE BASINS

The extraction wells and recharge basins were in operation during the Site visit. Although the extraction/recharge system flow was not determined, a significant amount of water was being discharged to the northernmost basin during the visit.

It appeared that new monitoring wells and a preliminary boring for extraction well EW-8 had been recently installed at the time of the visit.

3.5 EXTRACTION SYSTEM CONTROL BUILDING (ESCB)

Electrical contractors were working on the controls within the ESCB at the time of the visit. The ESCB had been in use for several months prior to this visit and the controls appeared to be in good working order. Some water had accumulated in the vault of the building due to surface water runoff and seepage around the foundation. This problem was being addressed at the time of the visit by installing drainage swales around the building.

3.6 GROUNDWATER TREATMENT FACILITY (GWTF)

The GWTF was operational at the time of the visit. A walk through was performed under Level D personal protection conditions. No extraordinary conditions were observed. Several minor leaks were observed from tanks and pumps. However, these leaks were addressed by secondary containment and there appeared to be no hazards associated with these leaks. Follow-up discussions with GWTF personnel indicated that all units were operating properly. Operations are monitored by the USACE on-site resident engineers and are reported monthly by GWTF personnel to EPA.

SECTION 4.0
ARARS REVIEW

A review of ARARs was conducted to evaluate whether the remedial actions are protective of human health and the environment. The review accounted for updated regulatory standards promulgated since the RODs were issued.

4.1 STANDARDS REVIEW APPROACH

Chemical-specific ARARs, including criteria to be considered (TBC), used during development of the RODs were updated and any changes evaluated to determine the effects of the changes on the chosen remedial action and action effectiveness. The standards review was based on review of EPA-provided documents as well as published federal, state and local rules and regulations.

An analysis of newly promulgated or modified requirements of state or federal environmental regulations was conducted to determine if these ARARs call into question the protectiveness of the remedy. Within this report, chemical-, location-, and action-specific requirements are tabulated. Changes to the requirements since the RODs were signed are highlighted.

The standards review also includes examination of analytical data collected from the Site and the groundwater treatment plant, including quarterly monitoring data in comparison to federal and state standards. Recommendations are made as to whether any changes to the list of constituents of concern need to be made.

The basis for the Site RODs for OU-1, OU-2 and OU-3 was developed prior to promulgation of the revised National Contingency Plan (40 CFR Part 300, March 1990) and prior to publication of the CERCLA Compliance With Other Laws Manual: Parts I and II, (OSWER Directives 9234.1-01 and 9234.1-02, respectively), although existing Draft ARAR procedures were followed in the ROD for OU-3. Many changes to the ARARs have occurred since the three RODs were developed. These changes are presented in the subsequent subsections.

4.2 ARARS REVIEW - OPERABLE UNITS 1 & 2

The 1986 ROD for OU-1 and OU-2, Groundwater Extraction and Treatment plus Soil Excavation and Treatment (U.S. EPA, 1986) set forth the following ARARs for the selected source control and management of migration remedy:

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act, and associated state regulations
- Safe Drinking Water Act
- Clean Air Act, and associated state regulations
- Executive Order 11990 (Protection of Wetlands)
- Executive Order 11988 (Floodplain Management)

Since this ROD was completed prior to promulgation of the revised National Contingency Plan (40 CFR Part 300, March 1990) and prior to publication of the CERCLA Compliance With Other Laws Manual: Parts I and II, (OSWER Directives 9234.1-01 and 9234.1-02, respectively), the ROD does not provide detailed analysis of the applicability or relevance and appropriateness of each regulation. For the purposes of this review and compliance with current requirements, the following tables have been prepared:

Table 4-1: Potential chemical-specific ARARs and guidance for OU-1 and OU-2 are evaluated in this table, using the regulations listed in the ROD as a basis. The evaluation includes a determination of whether the rule is currently ARAR or TBC and whether the remediation is in compliance with the ARAR.

Table 4-2: This numerical, chemical-specific ARARs table presents drinking water and groundwater protection standards for OU-1 groundwater chemicals of concern. The contaminants of concern listed at the top were identified as critical contaminants in the 1986 ROD for OUs I and II; "other compounds detected," at the bottom of the table, identifies criteria for compounds detected at levels exceeding SDWA MCLs during 1997 groundwater

monitoring. The 1989 Site Maintenance Plan (M&E, 1989) specified that the regulatory criteria for closure of the GWTP/extraction system be the attainment of MCLs for all contaminants.

Table 4-3: Potential location-specific ARARs and guidance for the entire Site are presented.

Table 4-4: Potential action-specific ARARs and guidance for the OU-1 and OU-2 remedies are evaluated, using the regulations listed in the ROD as a basis. The evaluation includes a determination of whether the rule is currently ARAR or TBC.

Overall, many of the ARARs have changed since the 1986 ROD was signed. The referenced tables provide a summary of current state and federal ARARs. In addition, criteria to-be-considered are also modified from the previous ROD presentations. Massachusetts Drinking Water Health Advisories have been replaced by Massachusetts Office of Research and Standards Guidelines (ORSGs). Federal acceptable intake chronic and subchronic values are no longer used, having been replaced by Risk Reference Doses (RfDs). In addition, RfDs and Carcinogen Assessment Group (CAG) slope factors are two of several factors that may be used to calculate risk at a Site. These criteria do not need to be identified in the ARAR section as they are usually covered under the RI/FS risk assessment discussion of a five-year review. This five-year review does not include recalculation of risk. Therefore, RfDs and CAG slope factors are not updated on the numerical groundwater criteria tables and are not discussed in the chemical-specific ARARs table.

Revisions to the chemical-specific requirements can affect treatment plant operation and maintenance. Environmental monitoring programs are frequently under review to address the chemical-specific ARARs, particularly the groundwater protection programs under RCRA and the Commonwealth of Massachusetts.

The wetlands ARARs identified in the Site RODs still apply today. A Wetland Restoration Plan was implemented to restore wetlands impacted by remedial measures. Wetlands monitoring is currently ongoing. The status of wetlands restoration was assessed during the Site visit (see Section 3.0).

Action-specific requirements were identified in previous RODs, although the regulatory considerations were not clearly distinguished for OU-1 or OU-2. An attempt has been made to clarify the requirements. The requirement status identified in the accompanying tables is accurate for on-going remedial actions.

4.3 ARARS REVIEW – OPERABLE UNIT 3

The 1989 ROD for OU-3, Sediment Excavation and Treatment (U.S. EPA, 1989) set forth the following ARARs for the selected source control and management of migration remedy:

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act (CWA)
- Executive Order 11990 (Protection of Wetlands)
- Executive Order 11988 (Floodplain Management)
- Clean Air Act (CAA)
- Occupational Safety and Health Act (OSHA)
- 310 CMR 30.00 – Hazardous Waste Management Requirements
- 310 CMR 6.00 – Ambient Air Quality Standards for the Commonwealth of Massachusetts
- 310 CMR 7.00 – Air Pollution Control Regulations
- 310 CMR 10.00 – Wetlands Protection Requirements
- 310 CMR 33.00 - Employee and Community Right-to-Know Requirements
- 314 CMR 4.00 – Surface Water Quality Standards
- 314 CMR 9.00 – Certification for Dredging and Filling
- 302 CMR 6.00 – Inland Wetland Orders

For the purposes of this review and compliance with current requirements, the following tables have been developed to revisit ROD specified ARARs.

Table 4-5: Potential chemical-specific ARARs and guidance identified in the ROD for OU-3 are re-evaluated in this table. The re-evaluation includes a determination of whether the rule is currently ARAR or TBC and if the requirement has been met.

Tables 4-6: This numerical, chemical-specific ARARs table presents a comparison of the ROD-specified standards (1989) to current (1998) standards for surface water quality for OU-3 chemicals of concern.

Tables 4-7*:* Potential action-specific ARARs and guidance identified in the OU-3 ROD are re-evaluated in this table. The re-evaluation includes a determination of whether the rule is currently ARAR or TBC, and if the requirement has been met.

Location-specific ARARs apply uniformly to the Site (OU-1, OU-2 and OU-3) and were presented in Table 4-3.

4.4 ARARS REVIEW – OPERABLE UNIT 4

The 1990 ROD for OU-4, Replacement of Lost Demand (U.S. EPA, 1990) set forth the following ARARs:

Chemical-specific:

- Safe Drinking Water Act
- Massachusetts Drinking Water Regulations

Location-specific:

- Executive Order 11990 (Wetlands Protection)
- Fish and Wildlife Coordination Act
- Clean Water Act
- Rivers and Harbors Act of 1899
- Resource Conservation and Recovery Act
- Massachusetts Wetlands Protection Act

- Massachusetts Waterways Act
- Massachusetts Surface Water Quality Standards
- Massachusetts Groundwater Quality Standards
- Massachusetts Water Quality Certification and Certification of Dredging
- Massachusetts Water Management Act
- Massachusetts Supervision of Inland Waters

Action-specific:

- Occupational Safety and Health Act
- Massachusetts Guidelines and Policies for Public Water Systems

Many of the ARARs identified would be applicable regulations at the off-site property. For example, the reopening of a Donna Road Well public drinking water supply facility would be required to meet all state and federal regulations. A discussion of "relevance and appropriateness" of requirements at off-site properties is not appropriate. ARARs for the Baird & McGuire Superfund Site have been discussed in sections 4.1 through 4.3. Standards for the Donna Road Well reopening are detailed in specification documents developed for that work being conducted under state authority, and are available from the Commonwealth of Massachusetts.

The Occupational Safety and Health Administration (OSHA) standards (i.e., 29 CFR 1910, 1904, and 1926) apply to worker safety, and require employers to communicate risks at the workplace to employees. OSHA standards are worker requirements, not environmental rules, and must be complied with during all Site work; they are no longer discussed as ARARs.

The DEP DWS published a document, called the Massachusetts Guidelines & Policies for Public Water Systems, that provides guidance for the exploration, evaluation, treatment, storage/ distribution, and protection of new public water supply sources (DEP, 1990). For all groundwater withdrawals, the document specifies an exploration phase, Site exam, five-day pump test, requirements for delineating three affected zones, and a final report. Compliance with this guidance would be provided in specification documents for the Donna Road Well.

SECTION 5.0
COMPLIANCE STATUS

5.1 OU-1 - GROUNDWATER

On-going remedial actions for groundwater are generally being conducted in compliance with state and federal environmental regulations. This includes the groundwater treatment plant which operates in compliance with state and federal RCRA hazardous waste generator rules. The treated groundwater discharge complies with MCLs.

Underlying groundwater contamination remains, however, and continued treatment is required to achieve state and federal drinking water standards, RCRA groundwater protection standards, and other federal and state groundwater protection standards. Constituents in Site groundwater still exceed criteria for arsenic, dieldrin, VOCs, and SVOCs. Identified as applicable or relevant and appropriate, the requirements under the Safe Drinking Water Act, RCRA Subpart F, Massachusetts Groundwater Quality Standards, and Massachusetts Drinking Water Requirements remain to be met. Groundwater requires continued remediation under these rules.

5.2 OU-2 - SOIL

Soil remediation activities have been completed and compliance with the ROD achieved. The only remaining soil remedial action is monitoring of wetland restoration. Material left on-site consists of incinerated soil (ash residue). The ash is covered with a soil layer, as specified by the ROD. Groundwater, surface water and sediment monitoring are in place at the Site, along with the groundwater treatment system. Monitoring has shown that the contaminant plume is shrinking.

The only remaining soil and sediment compliance issue is that of wetland remediation. As discussed in Section 2.2, the wetland was not restored in accordance with requirements regarding organic content of the soils. However, steps are being taken to correct this. Wetland restoration is in the implementation phase, and is following state and federal wetlands protection acts including

Massachusetts wetlands protection rules.. Remedial action for OU-3 was initiated later than remedial actions for OU-1 and OU-2. A three-year monitoring program is being implemented to evaluate compliance with wetlands restoration requirements. One monitoring event has been performed thus far. A full assessment of compliance with wetlands restoration requirements will be made after the third year of monitoring (year 2000), as required by the site restoration plan.

5.3 OU-3 - SEDIMENT

Sediment removal and treatment has been completed, consistent with the ROD, in areas ROD-specified for excavation. The site was regraded according to plan and according to floodplain delineation. Downstream sediment quality, however, requires continued monitoring and evaluation. The ROD established annual monitoring of sediments downstream in areas not excavated, to evaluate the success of natural degradative, depositional, and dispersal processes in reducing contaminant concentrations. Annual monitoring of river sediments has been conducted since completion of the sediment removal and treatment action (NED, 1998). As required in the ROD for this operable unit, compliance with the ROD remedy (no action in the downstream locations) will be fully evaluated after five years of annual sediment monitoring data has been collected. Currently, three years of monitoring have been completed. Wetland compliance issues for OU-3 are the same as discussed for OU-2, Soil, in Section 5.2 above.

5.4 OU-4 – LOST DEMAND

As this remedy is only in the design stage, it is too early to discuss compliance issues associated with the remedy.

SECTION 6.0
GENERAL DISCUSSION OF RISK

No additional assessment of risk was performed under this five-year review. This following summary of risk is based on prior risk assessments performed for the Site.

6.1 GROUNDWATER (OU-1)

A risk assessment performed under the 1986 Feasibility Study Report (FS) concluded that there would be significant risk to human health if the "no action" alternative was implemented and groundwater from the Site was ingested (GHR, 1986). The FS also indicated that there were no public or private drinking water wells located within one mile of the Site, and thus, there were no current exposures to groundwater. The ROD stated that the aquifer at the Baird & McGuire Site is classified as a Class II aquifer (current or potential usage) and required restoration of the aquifer to groundwater standards that are protective of human health and the environment. The objective of the groundwater remediation system is to remediate the groundwater to the target cleanup levels established during design (M&E, 1989). Continued operation of the groundwater extraction and treatment facility and the restrictions on groundwater use are still required to address risks.

6.2 SOILS

The risk assessment performed in the FS addressed exposure to Site soils and outlying areas. Based on the results of the FS risk assessment, the required lateral extent and depth of soil excavation were determined to reduce the risk to human health and the environment to acceptable levels within the Site. As stated above, soil excavation was completed in 1997. Risks in soils outside the excavation area were estimated as between 1×10^{-7} and 1×10^{-4}. These estimated risks were considered acceptable by EPA for certain exposure scenarios and thus, no remedial measures were required.

Future reuse of the Site may be limited by risk associated with potential exposure to remaining Site contaminants in soil. In 1997, qualitative risk assessments as part of the Site Reuse Study (M&E,

1998) were performed to evaluate the potential for Site reuse. The risk evaluation was performed for the construction scenario and child trespasser scenario only. Risks were evaluated separately for backfilled ash within the excavation area, the outlying Site areas where residual contamination exists (based on results of the RI), and in the deep soils below the bottom depth of excavation.

6.2.1 Backfilled Ash

Residual contaminants are present in the backfilled ash at concentrations greater than the risk-based concentrations for residential soils established by EPA, which suggests that the area should not be used for residential purposes (M&E, 1998). However, the report concludes that the calculated risk associated with incidental ingestion of backfilled ash suggests that the 12.5-acre area could be developed for commercial or industrial use.

6.2.2 Outlying Areas

The Site Reuse Study includes a qualitative risk-based evaluation of the 20 acres of Site soils outlying the excavation area. The study was based on data from the RI and RI addendum (GHR, May 1985 and June 1986). The study concluded that the risks for worker and trespasser scenarios were within acceptable levels and thus would not pose harm to future commercial/industrial workers or child trespassers.

6.2.3 Soils Below the Bottom Depth of Excavation

A qualitative risk-based evaluation of soils below the bottom depth of excavation was also performed as part of the Site reuse study. The evaluation was based on bottom-of-excavation soil data, and on soil data from the RI at depths corresponding to or greater than the bottom-depth soils. The evaluation only considered soils less than a depth of 15 feet, because it was assumed that contact with deeper soils by workers would be unlikely. The study concluded that these soils would not be of harm to future industrial or commercial workers, or to neighborhood children trespassing onto the Site.

6.3 SEDIMENTS (OU-3)

An analysis of risk was performed in the Focused Feasibility Study and summarized in the ROD. The analysis focused on direct exposure contact to arsenic, DDT, PAHs and chlordane in sediments. Target cleanup levels were developed based on the analysis. The OU-3 remedial action has been implemented consistent with the requirements of the ROD. Although contaminated sediments may remain in areas downstream from the site, it is expected that natural degradative, depositional and dispersal processes will gradually reduce contaminant concentrations. Long-term monitoring is being performed in downstream areas on an annual basis to monitor sediment levels. In general, sediment levels have remained below target public health cleanup levels. Ecological risks have been minimized by placing organic fill in the stream bed where the contaminated groundwater runs under the river. As a result of fish not being considered safe for consumption at this time, the Department of Public Health has posted a health advisory for the Cochato River, Sylvan Lake and Ice Pond. The intent of this advisory is to control any exposure through the consumption of fish. Based on the need to collect a sufficient amount of sediment and fish data from the river, a further evaluation will be performed for the next five-year review of the long-term monitoring program to demonstrate the effectiveness of the natural attenuation assumption in the ROD.

6.4 REPLACEMENT OF LOST DEMAND (OU-4)

The issue of risk for this operable unit is summarized in the following ROD statement (EPA, 1990):

> "As this operable unit does not address contamination from the Baird & McGuire Site, there were no Site risks associated with this fourth operable unit. Therefore, no risk assessment was performed in connection with this study."

SECTION 7.0
EVALUATION OF INSTITUTIONAL CONTROLS

Human health protection is further attained through the use of institutional controls that prevent or reduce exposures to remaining contaminants. Primarily this involves the use of zoning, deed use restrictions and fencing to protect and control access to the groundwater extraction and treatment system and to subsurface materials. Currently there are no institutional controls at the site as a result of the majority of the land not being available for re-use; however, EPA is in the process of developing institutional controls at the site and expects to have them implemented in the near future.

The Baird & McGuire Superfund Site is largely within an Industrial I District, although some outlying portions of the Site are zoned residential. Industrial zoning by-laws prohibit some uses, namely residential uses, hospitals, day cares, and kindergartens. Allowable industrial-zoning uses that are possibly consistent with other Site reuse limitations may include, but are not necessarily limited to: governmental buildings; adult education centers; laboratory or research facilities; automobile repair shops; drive-in banks; and various industrial, wholesale and transportation uses. Local zoning regulations are enforceable as long as they remain in effect.

A portion of the Site is also within a floodplain protection district and a substantial portion of the Site has been delineated as wetlands. In accordance with the zoning bylaws, any use of a lot in an industrial district that is overlaid in part or whole by the floodplain protection district requires a special permit by the Board of Appeals. A large part of the Site is not suitable for industrial development due to the presence of these ecological resources (e.g., the river, the wetlands, and the floodplain). Ecological protection from contact with contaminants can not, by character, be attained through the use of institutional controls.

In order to allow for the ongoing operation of the groundwater extraction and treatment system and the planned LNAPL recovery system, the following areas of the Site should not be relinquished for potential reuse until groundwater remedial actions are complete: the entire area within the existing fence surrounding the groundwater treatment plant; the area in the immediate vicinity of the

groundwater recharge basins; and the area in the vicinity of the extraction wells and the extraction well control building. In addition, groundwater within the Site boundary and the surrounding area should not be used for any purpose. Also, activities near the monitoring and extraction wells must be controlled to ensure compatibility with on-going remedial actions. Development in the vicinity of the wells must not prevent access to, or compromise the integrity of, the wells. Should existing fencing be removed, new fencing should be installed around areas where it is necessary to restrict access.

SECTION 8.0
RECOMMENDATIONS

8.1 TECHNOLOGY RECOMMENDATIONS

Recommendations for continued operation, monitoring, evaluation and remediation of the operable units are provided below.

8.1.1 Groundwater (OU-1)

The groundwater extraction/recharge system and GWTF is functioning so as to achieve the desired goal of restoring the aquifer to levels that are protective of public health and the environment. Documented decreases in plume size, significant contaminant mass removal from the plume area and recharge of treated water at or below MCLs are indicators of such performance. EPA and USACE are attempting to address the sources of groundwater contamination by removing pools of LNAPL existing at the Site. If successful, this effort could significantly decrease the time required to achieve clean-up goals. EPA will continue to evaluate the performance of the LNAPL recovery system; however, if total LNAPL removal cannot be achieved with the current system, many technologies that are rapidly evolving may prove to be viable forms of treatment in the future. Applicability of evolving technologies will be evaluated in the next five year review.

With strong evidence of natural biodegradation occurring, natural attenuation should also be considered as a viable approach for attenuating the plume and achieving cleanup goals. It is recommended that future groundwater monitoring be tailored to collect data necessary for the evaluation of natural attenuation. Recommended groundwater sampling parameters in addition to data currently analyzed for includes:

- Dissolved Oxygen
- Methane
- Sulfide

- Oxidation/reduction potential (ORP)
- Iron (II) and Iron (III) in addition to total iron.

This data can be used in conjunction with data currently collected such as VOCs, SVOCs, chloride, nitrate and sulfate concentrations to determine the efficacy of natural attenuation in restoring groundwater to protective levels in an adequate time frame. Natural attenuation modeling and contaminant transport modeling will likely be necessary to perform this evaluation.

The OU-1 ROD (EPA, 1986) recommends the following:

> "After five (5) years of operation and evaluation, the Agency will prepare a supplemental decision document to determine how long the groundwater extraction and treatment system will remain operational and to document that the target levels are achievable."

The evaluation referenced in this ROD statement is premature at this time for the following reasons: the incineration project significantly reduced the ability to pump groundwater at treatment capacity for two years and enhancements to the groundwater treatment system are currently being implemented (i.e., the LNAPL remediation system). Consequently, the ROD-specified evaluation of the groundwater extraction and treatment system will be postponed until the next five-year review to allow the LNAPL remediation system to operate for a period of time, and to determine how much of the contaminant sources the LNAPL system can feasibly remove.

In summary, the following recommendations are made for OU-1:

1. Continue operation of the groundwater extraction and treatment system. Continue to evaluate extraction well performance and modify operation as necessary to maximize flow rate and optimize groundwater recovery.

2. Continue to operate the LNAPL remediation system and optimize LNAPL recovery. The success of the LNAPL remediation system in removing a significant source of groundwater contamination should be assessed. Depending on the success of remediation,

the use of other technologies for removing LNAPL sources or enhancing groundwater remediation may be necessary.

3. The ROD specified evaluation of the groundwater extraction and treatment system will be postponed until after the LNAPL remediation system is operational in order to determine how much of the contaminant sources the LNAPL system can feasibly remove.

4. Continue groundwater monitoring and yearly comprehensive evaluation of plume configuration to track progress in plume remediation. The performance of the system should be evaluated in terms of plume size and containment by comparing plume maps and observing trends in Site contaminants.

5. Natural Attenuation. Evaluate the extent to which natural attenuation is occurring in groundwater and predict impact on plume restoration. Future groundwater monitoring should be tailored to collect pertinent data necessary for evaluation of natural attenuation. The process of biodegradation may be a significant factor in total plume remediation once LNAPLs are removed from the groundwater.

6. Restrict future land and water use consistent with the recommendations of the Site Reuse Study.

8.1.2 Soils (OU-2)

The OU-2 remedy specified in the ROD has been completed. Qualitative risk analyses of residual contamination have been performed and the Site has been deemed potentially suitable for commercial or industrial use provided that trespasser scenarios are limited. The vegetative soil layer will be maintained and replaced as necessary to maintain cover over ash residue and prevent erosion. Continued monitoring and evaluation of restored wetlands will be performed to ensure that wetlands remain viable. Recommendations for future evaluations are as follows:

1. Wetlands Restoration. Trends in wetlands restoration should be evaluated to determine if a viable wetlands has developed or will develop in a reasonable time frame. Evaluate compliance with restoration requirements based on three years of monitoring data.

2. Site use. Assess the adequacy of legally-binding institutional controls. Evaluate Site use to confirm that only commercial and industrial activities have been performed at the Site, consistent with recommendations of the Site Reuse Report (M&E, 1998).

8.1.3 Sediments (OU-3)

The OU-3 remedy specified in the ROD has been substantially completed. Contaminated sediments have been treated and placed onsite as backfill. Long-term monitoring continues to be performed in downstream areas as required by the ROD. Trends of contaminant levels cannot be determined at this time due to lack of a statistically significant number of samples. As specified in the ROD, continued monitoring and evaluation is required, specifically:

- Annual monitoring downstream of Union Street;
- Annual monitoring in the Mary Lee wetland;
- Annual monitoring of Ice Pond;
- Annual evaluation of monitoring results; and
- A five-year review of the annual evaluations and an assessment of the protectiveness of both public health and the environment.

In addition, the following recommendations are made for future evaluations:

- Natural Attenuation. Evaluate the success of natural degrading, depositional, and dispersive processes in reducing contaminant concentrations in sediment. The long-term monitoring program will be supplemented to provide all necessary information needed to demonstrate the effectiveness of the natural attenuation assumption in the ROD. An evaluation will be performed after the site remedies have stabilized and a sufficient amount of sediment and fish data have been collected. It is expected that this evaluation will be performed for the next five-year review.
- Use of Cochato River Water. The ROD assumed that the Cochato River would not be used for a public water supply. There has been a recommendation by the town of Holbrook to consider using the Cochato River as input to a public water supply. The risks associated with use of this water should be evaluated carefully before implementation of this proposal. Sampling of Cochato River Water will be required to check that levels are protective of human health.

8.1.4 Replacement of Lost Demand (OU-4)

An evaluation of this remedy will be performed after its implementation.

8.2 STATEMENT ON PROTECTIVENESS

The remedies are protective of human health and the environment as long as use controls, as discussed in the Site Reuse Report (M&E, 1998), remain in effect. The following sections describe protectiveness of each separate remedy (operable unit) based upon its current status.

8.2.1 OU-1 – Groundwater

The current pathway for human health exposures has been eliminated as the contaminated aquifer is no longer being used as a drinking water source. The aquifer is being remediated to mitigate a future human health exposure pathway and data indicates that the plume of contamination is shrinking. There is, however, a continuing hot spot of contamination and high concentrations continue to be observed in overburden. For this reason, groundwater remedial actions need to continue. Residual contaminants present in groundwater are not expected to affect protectiveness as long as limitations on public use of groundwater are in place.

For continued protection, the groundwater treatment plant, recharge basins, monitoring wells, extraction wells, LNAPL recovery system, and piping network must remain undisturbed. Groundwater should not be used for any purpose, due to its contamination and to the negative impact pumping could have on the effectiveness of the extraction and treatment system.

It is believed that groundwater discharges to the Cochato River do not occur during periods of full plume containment. Actions have been taken to increase control of the plume. Placement of an organic filter layer in the area where there is potential discharge of contaminated groundwater provides further protection to the environment. Continued monitoring remains to be conducted to determine protectiveness of the surface water and sediment from recontamination by groundwater. Surface water sampling conducted in 1998 showed no detectable levels of site contaminants.

8.2.2 OU-2 – Soils

The ROD limited the excavation and treatment of soils to hot areas, and limited the depth of the excavation due to complications of excavation into the water table. Residual soil contamination is present on site, in terms of both areas beyond and below the excavation limits and in terms of the backfilled ash. Protectiveness to human health is attained through controls of potential on-site use activities. As long as the Site is not used for residential purposes and the appropriate fencing is maintained to prohibit trespassing by children, human health protectiveness will be within the risk-based concentrations established by EPA.

Protectiveness is achieved for future workers in a commercial or industrial use scenario. Contaminants present at depths greater than 15 feet below grade are considered unlikely to be contacted directly by individuals during future Site development activities, including construction and utility work. Continued monitoring of wetlands is needed to confirm that the wetlands remain viable, and therefore protected.

8.2.3 OU-3 – Sediments

Sediment with a high degree of contaminants was excavated and treated, and clean fill used to replace materials excavated. To minimize disruption to wetlands, sediments were not removed from areas of the river where contaminant concentrations were low. Although contaminated sediments may remain, it is expected that natural degradative, depositional, and dispersal processes will gradually reduce remaining concentrations in the sediment. Long-term monitoring will be conducted to evaluate contaminant levels and their behavior over time.

8.2.4 OU-4 – Lost Demand

There are no protectiveness issues associated with this operable unit, because it does not address a contaminated media. Rather, this operable unit addresses a lost resource.

8.3 NEXT REVIEW

Five-year reviews are done every five years at sites where contaminant levels remain at concentrations that prevent unlimited, unrestricted use of the Site. Since remedial actions have not been completed for all operable units, and since the remedy does not allow for unrestricted use of the Site, a follow-up five-year review will be required. Five-year reviews are triggered by the date remedial actions are initiated at any operable unit. When a five-year review is conducted at a time other than when it is due, the next five-year review is due within five years of the time when it was originally required (U.S. EPA, 1994). Each five-year review is to cover all operable units, whether or not remediation at that unit is complete (EPA, 1994). The next five-year review for the Baird & McGuire Site should be conducted in 2001. This will be a statutory review triggered by the implementation of remedial actions at OU-3.

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